

rockglaciers', but from a rather singular perspective. Some data are not presented, but there are always problems of what to include for any author. A more serious point relates to the omission of discussion. Any alternative views to the permafrost model are treated with disdain rather than dispassionate critique. There are many references to 'wrong views' and 'wrong interpretations'. Such selectiveness detracts from the utility of the book and the one-sidedness is unscientific at best and censorship at worst. This review cannot provide the detailed arguments needed for readers to be able to judge the book's scientific integrity. However, there is no reason to conclude that the volume should be

disregarded. It will repay close study, but those neutral in the conflict need to be forewarned. Despite being selective, *Rockglaciers* brings together a wide variety of information and contains a good, although by no means complete, bibliography. Finally, in these days of finely tuned library budgets, value for money is an issue. The paper and printing quality are good but proof-reading leaves something to be desired. Unfortunately, the book is just far too expensive unless there is a really pressing need for its acquisition.

W. BRIAN WHALLEY
The Queen's University of Belfast

RECONSTRUCTING QUATERNARY ENVIRONMENTS (2nd edition) by J. J. Lowe and M. J. C. Walker, Addison Wesley Longman, Harlow, 1997. No. of pages: xxii+446. ISBN 0-582-10166-2.

This book is remarkable for the sheer volume and the comprehensiveness of the information it provides. With around 370 pages of text, and a 60-page bibliography, I find it hard to believe that anyone interested in the Quaternary could not find something new and useful in this book.

After the introductory chapter, which briefly covers the character and duration of the Quaternary, the historical development of Quaternary studies, and the resulting framework for the Quaternary and possible causes of climatic change, the main body of the book divides into three parts. In Chapters 2 to 4, the geomorphological, lithological and biological evidence that forms the basis for environmental reconstruction is outlined. Chapter 2 includes discussions of glacial and periglacial landforms, sea-level changes, river terraces and landforms at low latitudes. Chapter 3 examines glacial and periglacial sediments, palaeosols, low-latitude lake sediments, aeolian sediments, cave and other carbonate sediments, lake, mire and bog sediments, deep-ocean sediments and ice-core stratigraphy. Chapter 4 then covers pollen analysis, diatoms, plant macrofossils, fossil insects, non-marine and marine mollusca, ostracods, foraminifera, deep-sea sediment micropalaeontology, vertebrates, and includes shorter discussions of some other fossil groups. Within this group of chapters, each section follows broadly the same pattern; the nature of the evidence is discussed first, followed by the techniques used to analyse and interpret it; finally, the main uses of the evidence in environmental reconstructions are considered.

The second part of the book, Chapters 5 and 6, firstly reviews the various dating methods used in Quaternary science, then turns to the principles of stratigraphy and correlation used to construct spatial and temporal sequences from fragmentary evidence. Chapter 5 is similarly organized to Chapters 2–4; each method is presented in turn, and its techniques, uses and limitations are discussed. Chapter 6 deals firstly with the techniques and problems of temporal ordering (i.e. stratigraphy) of the various types of evidence discussed in the first part of the book, and then turns to the techniques and problems of spatial ordering of evidence (i.e. correlation).

The final part of the book, Chapter 7, presents a 'case study' of Quaternary environmental reconstruction, to show how the disparate lines of evidence available can be brought together to provide a coherent picture of environmental change. This chapter is new to the second edition. The case study used is the North Atlantic region over the last climatic cycle. The discussion covers the broad stratigraphic framework of the period 130 000 years before present (BP) to 10 000 years BP, then covers the main subdivisions, including the last interglacial, the interglacial/glacial transition, the last 'cold stage', and the glacial/interglacial transition, in much more detail. In particular, these sections seek to draw together the disparate lines of evidence available from oceanic, terrestrial and ice-core records for each period to provide a regional picture of the environment of the North Atlantic, and how it changed during the period in question. These reviews are generally impressively up-to-date, given publishing constraints; most sections include citations to papers published as recently as 1995, although it is a pity that the debate concerning the validity of apparent Eemian climatic oscillations in the GRIP and GISP2 ice cores is not touched upon. The chapter then turns to the uses and limitations of models, and Global Circulation Models in particular, in Quaternary studies, before reviewing the various causes for the climatic and environmental changes discussed in the previous section. These include astronomical (orbital) influences, the role of the oceans, ice-sheet fluctuations, atmospheric gas content, volcanism, solar output and geodynamic factors. The chapter concludes with a brief review of broad conceptual models which attempt to explain the climatic changes over an interglacial/glacial cycle.

To conclude, although some Quaternary specialists may, as the authors admit, argue about the detailed content of sections of the book, and the balance of detail in the various parts of the book, the overall value of this comprehensive review cannot be denied. As an undergraduate and postgraduate, I made great use of the first edition; I am sure that current students of the Quaternary at all levels, and even Quaternary researchers seeking information about fields outside their own specialization, will find this revised edition of equal value.

NEIL ARNOLD
*Scott Polar Research Institute
Cambridge*